

OVERVIEW

Brazil has a large and diversified economy that offers US companies many opportunities to export their goods and services. As Brazil's largest single trading partner, the US enjoys a strong reputation in a variety of sectors. This report will cover relevant aspects of the Industrial Automation sector and it is one of a series that is published by the US Commercial Service's team of sector experts throughout the year. If you do not see an opportunity for your product here, please check out our other reports at www.buyusa.gov/brazil and consider contacting us directly to find out if we can help you export to Brazil.

SUMMARY

This report will focus on the first generation companies in the Brazilian petrochemical sector and on sector within the petrochemical production chain that utilizes raw materials derived from petroleum and natural gas to obtain intermediates and thermoplastic resins.

Brazil spent 2004 regaining the confidence of the markets after the currency crisis of the second half of 2002. GDP grew by 5 percent in 2004 as the government implemented tight fiscal policies to calm financial-market nerves and mitigate the inflationary effects of the previous year's currency depreciation. After investors' initial doubts, the newly elected Lula government was able to reassure markets that it would continue the orthodox economic and financial policies of Lula's predecessor, Fernando Henrique Cardoso. The real is comparatively highly valued vis-a-vis the dollar, fluctuating between R\$ 2.3 and R\$ 2.8 / US\$ 1, in the first half of 2004 and thus favoring imports.

MARKET HIGHLIGHTS

The Brazilian petrochemical sector is the most dominant and dynamic segment of the diversified Brazilian chemical industry, with net revenues estimated at US\$ 59 billion in 2004, representing a 29% increase from 2003.



Trade Balance

The trade balance of the Brazilian chemical sector has shown consecutive deficits in the past years. Although Brazilian exports of chemical products reached US\$ 5.9 billion in 2004, approximately 23% higher from 2003, imports increased at an even higher ratio, reaching US\$ 14.5 billion in 2004.

The segments that have contributed the most to this trade deficit in the chemical industry are: pharmaceuticals, fertilizers and agricultural chemicals, and petrochemicals. In 2004, of the US\$ 8.5 billion total trade deficit, approximately 38% originated from fertilizers and agricultural chemicals, 28% from pharmaceuticals, and 25% of petrochemicals (organic chemical products.)

Sector Integration

The petrochemical chain is made of first generation companies and production units which produce basic petrochemicals – olefins (ethane, propane and butadiene) and aromatics (benzene, toluene and xylene) – and of second generation companies and production units, which produce intermediate products and thermoplastic resins. Third generation companies, better known as plastic production companies, are clients of the petrochemical industry, and they transform second generation and intermediate products into

materials and products to be used in several segments, such as packaging, construction, electric, electronic and automotive.



The Brazilian petrochemical industry, as other global petrochemical industries, is organized into groups, in order to take advantage of logistic synergies, infrastructure and operational integration, as well as to minimize costs. The units that make up the petrochemical groups are mostly first and second generation.

The current format of the Brazilian petrochemical industry is the result of a government plan, initiated in 1965, to create GEIQUIM, the Executive Group of the Chemical Industry. The petrochemical plan for Brazil created three petrochemical complexes: The Cubatão Petrochemical Complex (1972), the Camaçari Petrochemical Complex (1978) and the Triunfo Petrochemical Complex (1982). These petrochemical complexes are located next to Petrobras refineries and are comprised of first generation (devoted to cracking) and second-generation (devoted to derivative products) petrochemical industries. Other smaller petrochemical plants are located in other parts of the country, but they are secondary in importance.

Competition

The privatization of state-owned companies that occurred in the '90s, followed by the Brazilian market opening and import tariff reductions, did not favor new investments in the Brazilian petrochemical industry primarily due to the weakening role of Petrobras.

During the '90s, Petrobras ceased to act as an industrial policy planner for the petrochemical

sector and had to sell most of its participation in Brazilian petrochemical companies. As a result, this sector registered a meager nine percent market growth between 1990 and 1997, while the Brazilian GDP increased by roughly 21 percent in the same period. Since, on average, 83 percent of the variable costs of the petrochemical industry originate from costs of raw materials.

Petrobras' withdrawal from this sector had a strong negative impact on the competitiveness of the Brazilian petrochemical companies. As a result, second generation petrochemical companies became more sensitive to competition from imported products.

The three first-generation petrochemical companies, Petroquímica União, Braskem-Unidade de Insumos Básicos and Copesul, are predominantly Brazilian companies. The same is true for the majority of the second-generation companies, among them, Braskem, Oxiten, Petroflex and Ipiranga. Multinational companies, such as Dow Chemical, Rhodia, Basell (association of the petrochemical divisions of Basf and Shell), Solvay and others have a more substantial participation in the second and third generations through their local subsidiaries, some of them pre-dated the establishment of the Brazilian petrochemical complexes.

Multinational companies operating in Brazil distinguish themselves from national companies by producing products with higher aggregate value, mainly in chemical specialties with strong technological content. They are constantly updating and developing new products through research support and centers located in their countries of origin.

Despite Brazil's impressive 3-million tons/year production of ethylene (the catalyst in petrochemical production), which accounts for 3 percent of the world supply, Brazilian petrochemical companies are not fully integrated, as happens in the United States and Japan. The Brazilian petrochemical industry is split among a large number of companies with large horizontal organizational structures when compared to the rest of the world.

While the foreign petrochemical companies operating in Brazil are controlled by their headquarters overseas and operate according to their worldwide strategy, their Brazilian counterparts are limited by their size and work largely within local markets only. The Brazilian petrochemical industry is controlled by a mix of stock ownership involving a small group of controlling investors, the most important being the Odebrecht, Ultra, Mariani, Unipar, Petroquisa, Ipiranga and Suzano Groups. This tangled picture of ownership is one of the factors that slow the decision-making process in terms of both production expansion and investment in technological innovations for the medium and long term. This, in turn, compromises the competitiveness of the sector.

As an example, the Cubatão Petrochemical Complex, with production units in Capuava, Santo André and Paulínia, accounted in 2001 for no fewer than 24 different second-generation companies. In Camaçari, there are 19 second-generation companies besides Copene (renamed Unidade de Insumos Básicos of Braskem). In Triunfo, Copesul supplied seven second-generation companies in 2001. Also, it is not uncommon for the same company to be present in all three petrochemical complexes.

PQU, Camaçari, Triunfo and Riopol

The Brazilian petrochemical sector is basically distributed into three complexes: São Paulo's Cubatão; Camaçari, in Bahia; and Triunfo, in Rio Grande do Sul. The three complexes use petrochemical naphtha, partially produced by Petrobras (70%) and partially imported directly by the individual companies (30%). Starting in the second semester of 2005, with the beginning of operations by Rio Polimeros, Brazil will have a new petrochemical unit focusing only in the production of ethane and polyethylene, in Rio de Janeiro, differentiating from the others for utilizing as raw materials ethane and propane from natural gas extracted by Petrobras from the Campos Basin.

The installed capacity of the three raw material centers in Brazil, in 2004, was:

	Camaçari		Triunfo		PQU	
	Tons/year	%	Tons/year	%	Tons/year	%
Ethane	1,280,000	44	1,135,000	39	500,000	17
Propane	530,000	39	581,000	43	250,000	18
Butadiene	170,000	48	105,000	30	80,000	23
Benzene	438,000	49	265,000	29	200,000	22
Toluene	40,000	19	91,000	44	75,000	36
Xylem	270,000	58	66,000	14	130,000	28
TOTAL	2,728,000	44	2,23,000	36	1,235,000	20

Source: Abiquim (Brazilian Chemical Industry Association)

São Paulo - PQU

The São Paulo Petrochemical Complex is located in the city of Cubatão, with production units in Capuava, Santo André and Paulínia. PQU (Petroquímica União) is the raw material center for this petrochemical complex. Six groups, in a complex shareholders agreement, share the control of PQU. The multifaceted arrangement makes it difficult to attract new investments and to integrate second-generation producers. Constant disputes among shareholders are another problem faced by PQU.

The companies that integrate PQU shareholding structure are:

Company	% of voting share
Unipar	37.2
Dow/Union Carbide	13.0
Polibrasil (Suzano/Montell)	6.8
Oxiteno (Grupo Ultra)	1.9
Petroquisa	17.4
SEP (Employees)	6.7
Others	17.0

On the positive side, PQU is favored by an excellent geographic location. Located in the Greater São Paulo area, PQU is currently (until Rio Polimeros begins operation) the only Brazilian petrochemical complex located near the large Brazilian consumer centers.

The proximity to the consumer market is, with no doubt, the main advantage of the São Paulo Petrochemical Complex. Second generation

companies located in the other petrochemical complexes in Bahia and Rio Grande do Sul were required to establish distribution centers in Sao Paulo in order to supply their clients in this region, representing a substantial increase in logistics costs.

The proximity to the main refineries in the country allows PQU to receive the totality of its raw material from Petrobras, through ducts. On the other hand, since PQU does not possess its own terminal for naphtha imports, like Copesul and Braskem, its expansion has been constrained by Petrobras supply. Also, the characteristics of the Brazilian petroleum (heavy) means that Petrobras supplies low quality naphtha to PQU.

PQU's production capacity is 500 thousand tons/year of ethane, 250 thousand of propane, 80 thousand of butadiene, and 527 thousand of aromatics. This reduced production scale is partially due to plants with outdated technology, some operating equipment that is more than 30 years old.

As mentioned before, another obstacle to increasing production capacity at PQU is the difficulty in obtaining raw material. Recently, PQU announced an agreement with Petrobras to increase the supply of raw material, mainly for refinery gases, with the objective of expanding capacity from 500 thousand to 700 thousand tons/year of ethane. The expansion will diminish the disadvantage of production scale but it still does not take PQU to an ideal size.

PQU is a raw material center independent from the second-generation companies in the Sao Paulo Petrochemical Complex, which are its main consumers. The lack of business integration with these companies and PQU's inability to expand its operations are the main barriers to PQU competitiveness. A merger of PQU with other second-generation companies in the Sao Paulo Complex and with Rio Polimeros could be a viable alternative for the creation, through consolidation, of a leader company in the region.

Camaçari – Braskem

Braskem is the raw material center for the Camaçari Petrochemical Complex. The Brakem Company is part of the Odebrecht Group and accounts for 13 plants, aside from participation in other companies, with special attention for the share control of Copesul.

Braskem was created in 2002 in a merger between Copene and various petrochemical companies controlled by the Odebrecht and Mariani Groups. With annual revenues above US\$ 2 billion, Braskem has become the largest petrochemical group in Latin America. The company has initiated a business restructuring process towards a more vertical organizational structure, opening a new horizon for the Brazilian petrochemical industry. By combining first and second generation structures focusing on thermoplastics (PE, PP and PVC) produced at modern plants, Braskem expects to increase its economies of scale and obtain a higher level of competitiveness. This will place the company in an advantageous position to face other sector restructurings that will, inevitably, take place in the Brazilian petrochemical sector.

The Brakem industrial complex represents almost 50% of the national production capacity of basic petrochemicals and thermoplastic resins. The shareholding composition of Braskem is:

Company	% of voting share
Odebrecht	43.4
Norquisa (Odebrecht)	29.4
Petroquisa	7.8
Previ	2.9
Mariani	3.4
Petros	2.9
Market	10.2

Besides the control of the Camaçari Petrochemical Complex, Braskem has its main second generation plants in the Triunfo Petrochemical Complex and in the city of Maceio. Only two polyethylene plants and one PVC plant are located in Camaçari.

Brakem's 'Unity of Basic Products' (UIB) production facilities has installed capacity of 1,280 thousand tons/year of ethane (approximately 44% of the Brazilian installed capacity), 530 thousand

tons/year of propane, 170 thousand tons/year of butadiene and 1,022 thousand tons/year of aromatics. Braskem has a competitive industrial production scale and gains in synergy because it is relatively integrated and diversified in the production of three main thermoplastics (PE, PP and PVC). In terms of economy of scale, Braskem has an advantage over the other centers.

Braskem obtains 70% of its naphtha from Petrobras, with the remaining coming from imports, mostly from Africa and South America. Braskem has tried, as an alternative, to consume other petroleum fractions, such as the condensed, with growing availability in the Middle East and Africa, since Brazil does not produce significant quantities of condensed.

The mix of products of the Braskem center is the most complete among the suppliers. This is because the Camaçari Petrochemical Complex project group includes several second-generation companies.

Triunfo – Copesul

Copesul is the raw material center of the South Petrochemical Complex, known as Triunfo. The company processes naphtha, besides condensed and GLP, to generate the basic products that feed the second-generation companies of the petrochemical chain.

Copesul produces around 40% of the ethane consumed in Brazil, with installed capacity of 1,135 thousand tons/year. Besides ethane, its main product, the company also produces propane (581 thousand tons/year), butadiene (105 thousand tons/year) and aromatics (431 thousand tons/year), among others, totaling around 3 million tons/year of petrochemicals. More than 80% of the first-generation petrochemical products from Copesul are consumed in the Triunfo Petrochemical Complex. The remaining is sold to other parts of country or exported.

The comparative advantage of Copesul in relation to the other petrochemical centers is its flexibility in processing different loads, which allows for larger quantities of condensed (less expensive raw material and available in the international market),

instead of naphtha. Besides this, the proximity with the Argentinean market permits imports of raw materials from Argentina and exports to Mercosul.

Braskem and Grupo Ipiranga share control of Copesul, and it is enforced by a shareholders agreement, which allows for mutual preference rights among the parties. The two controllers are also the principal clients of the raw material center, consuming the majority of the olefins produced. The shared controlled of Copesul is:

Company	% of the voting shares
Braskem/Odebrecht	29.5%
Ipiranga	29.5%
Petroquisa	15.6%
Others	25.5%

Copesul's weak points include the difficulties presented by having shared control by two groups who are also competitors, coupled with the uncertainty of Grupo Ipiranga's long-term presence in the petrochemical sector.

A possible alternative to increase Copesul's competitiveness is the incorporation of second-generation companies in the Triunfo Petrochemical Complex, as with the Camaçari Petrochemical Complex. There is also the possibility that Braskem would exercise its preference rights if Grupo Ipiranga chose to sell its participation in Copesul. This would result in the full integration of Copesul with Braskem.

The incorporation of Copesul by Braskem would result in the control, by the Odebrecht Group, of the two main national petrochemical centers in Brazil, representing more than two thirds of the Brazilian production of basic petrochemicals and 50 percent of the general petrochemicals production. This incorporation would increase the competitiveness of Copesul and Braskem, but would also increase concentration in this sector. This concentration could, on the other hand, be countered once Rio Polimeros begins production and if other new investments take place.

Rio de Janeiro – Rio Polimeros

Rio Polimeros (Riopol), in the state of Rio de Janeiro, a project estimated at US\$ 1 billion, was inaugurated in June 2005 and is ready to begin operations. The company has control shared by Brazilian private groups Unipar (33.3%) and Suzano Química (33.3%), besides Petroquisa (16.7%) and BNDESPAR (16.7%).

The largest gas-chemical project in Latin America, Riopol is installed next to the Duque de Caxias Refinery (Reduc), controlled by Petrobras. Riopol will be the first integrated industrial gas-chemical complex and the second producer of polyethylene in Brazil.

Riopol will produce resins from fractions of ethane and propane from the natural gas originating from the Campos Basin and separated in units in Campos and at Reduc. These fractions will be used as raw material, substituting naphtha, and competitive in terms of substituting for ethane due to a higher conversion efficiency. However, the use of natural gas as raw material does not allow for the production of aromatics and other by-products, such as solvents and high-octane gasoline.

Riopol will integrate the production of first and second generation, ethane and polyethylene, in the same production unity, becoming one of the largest in the world. The company will produce approximately 520 thousand tons/year of ethane, 75 thousand tons/year of propane and 540 thousand tons/year of polyethylene.

The main advantage of using natural gas instead of naphtha is related to the cost of the project. The investments for the implementation of a natural gas project are around 50 percent lower in comparison with projects using naphtha as raw material in the petrochemical production. Another competitive advantage of Rio Polimeros relates to the proximity to the consumer markets; the South and Southeast regions of Brazil are responsible for

approximately 80 percent of the national consumption of polyethylene.

Rio Polímeros expects to export around 30 percent of the polyethylene production (150 thousand tons/year), representing approximately US\$ 100 million. The company has signed a sale contract for 10 years with exporter Vinmar.

The remaining production will be sold on the local market to meet the growing demand expected for the next few years in segments of packaging films, household goods and basic sanitation. The plastics industry, Brazil's main petrochemical client, grows at a rate three times higher than the Brazilian GDP. Today, the Brazilian annual production is at 1.5 million tons/year of polyethylene, enough to meet to local demand. In face of the expected expansion of the Brazilian economy, the sector will require investments in production.

The Riopol financing has two parts. A company was formed, Rio Polímeros S.A., with the four shareholders. The partners were responsible for 40% of the investment. The remaining financing was supplied by three main financial institutions: BNDES, Eximbank and Sace (Italy), the latter only assuming the commercial and political risk.

MARKET OUTLOOK

The growth in demand has forced an increase in production for almost all of the products in the petrochemical sector. Expected growth in Brazil means that local production will reach the limit of the installed capacity in a few years.

Comparing the projected demand with the current installed capacity of the Brazilian petrochemical industry, and not taking into account any future expansion projects, with the exception of Riopol, the surplus/deficit in capacity in tons/year, by resin, for the years 2008 and 2013 are shown in this chart:

Year	PEAD	PEBD	PEBDL	PP	PET	PVC	PS
2008	145,941	37,527	114,440	469,806	394,066	257,111	219,120
2013	(789,946)	(332,445)	(633,727)	(2,348,115)	(1,283,605)	(970,585)	(11,672)

The Brazilian petrochemical industry will have to make a series of investments to meet the growing internal demand and to eventually expand into foreign markets. Investments of over US\$12 billion would be necessary to expand the Brazilian petrochemical industry until 2013, to meet the growth in demand in local markets. A list of the necessary investments follows:

2008

2nd Generation	Plants	Capacity (t)	Value (US\$/t)	Total (US\$)
PP	2	250,000	800	400,000,000
PTA/PET	1	450,000	1,300	585,000,000
MVC/PVC	1	300,000	1,000	300,000,000
		1,250,000		1,285,000,000

1st Generation	Coefficient	Quantity (t)	Value (US\$)	Total (US\$)
Ethane (Gas)		359,500	1,000	359,500,000
PTA/PET	0.31	139,500		
PVC	0.52	156,000		
Styrene	0.32	64,000		
		355,500	1,000	355,500,000
PTA/PET	0.79	355,500		
		200,000	800	875,000,000
Total investment	1st and 2nd	Generation	Until 2008	2,160,000,000

2013

2nd Generation	Plants	Capacity (t)	Value (US\$/t)	Total (US\$)
PEBD	1	350,000	1,200	420,000,000
PEAD	3	500,000	800	1,200,000,000
PP	4	450,000	800	1,440,000,000
PTA	2	450,000	1,300	1,170,000,000
Soda Chloride to PVC	2	300,000	1,600	960,000,000
Total		5,150,000		5,190,000,000

1st Generation	Coefficient	Quantity (t)	Value (US\$/t)	Total (US\$)
Ethane (Naphtha)	0.35	2,505,000	1,200	3,006,000,000
PTA/PET	0.31	279,000		
PVC	0.52	312,000		
Polyethylene	1.05	1,850,000		
Styrene	0.32	64,000		
Propane	0.25	1,789,286		
Aromatics	0.20	1,431,429	800	1,145,142,857
Others	0.20	1,431,429	300	429,428,571
Styrene		200,000	500	
Total				
Total Investment	1st and 2nd	Generation	2009-2013	9,930,571,429
Total Investment	2004-2013			12,090,571,429

Source: BNDES Setorial

BUSINESS OPPORTUNITIES

U.S. suppliers of equipment and services for the petrochemical industry should pay special attention to the developments in this sector in Brazil. There are several first- and second-generation projects being announced in the Brazilian media. Private sector companies, many with participation from state-owned Petrobras, will be responsible for operation of several of these projects.

Although the list of required investment and potential projects is quite extensive, it is still uncertain which of these projects will actually be implemented. USCS Brazil will continue to monitor and report on future projects as they become more concrete.

U.S. companies interested in becoming actively involved in the Brazilian petrochemical sector should seek a local partner, be it an agent, distributor or joint venture partner. USCS Brazil has specific services designed to assist U.S. companies in identifying ideal partners in Brazil.

KEY CONTACTS

- For more information about export opportunities in Brazil please contact US Commercial Service Trade Specialist Igly Serafim at:
Igly.Serafim@mail.doc.gov
- For a good overview of exporting to Brazil, please look at our US Country Commercial Guide to Brazil:
www.focusbrazil.org.br/ccg
- US Commercial Service in Brazil:
www.buyusa.gov/brazil
- For more reports on this sector in other countries, please visit Export.gov's site for US Commercial Service Market Research Worldwide:
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MAJOR TRADE SHOW



Rio Oil & Gas Show
Rio de Janeiro, RJ
September 2006

<http://www.ibp.org.br/main.asp?ViewID={AC0F4AD6-1B4A-4237-8D0D-B8EEDCB6354B}&LangID=en>

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